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EXAMINER	
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ART UNIT	PAPER NUMBER
1793	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/524,083	CHU, HUMBERT	
	Examiner	Art Unit	
	JENNIFER A. SMITH	1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *04 November 2008*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Status of Application

Claims 1, 12, and 13 have been amended.

Claims 1-20 are presented for examination.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2, 4-7 and 9-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Green et al. (US Patent No. 4,991,521). These claims are drawn to a catalyst regenerator (apparatus) and any claimed process limitations are not given patentable weight unless they affect the structure of the apparatus.

In regard to claim 1, Green et al. teaches a catalyst regenerator in Figure 1. The regenerator has a first section (12) in which spent catalyst enters and a second section (13) connected by an interface (13). The cross-sectional area of the second section is 15 to 90% of the average cross-sectional area of the first section [See Column 4, lines 19-22]. The limitation to oxidation of carbon to carbon monoxide and gas velocities etc

represents a process limitation in an apparatus claim, and is therefore not given patentable weight.

In regard to the amended features of claim 1, Green et al. teaches additional air or oxygen containing gas can be added from line 22 into the lift riser 23, preferably somewhat above the point of addition of spent catalyst to the FCC regenerator. This added gas would exhibit co-current flow with the downward flowing catalyst. The regenerator has a first section (12) and a second section (14). Because the first section has a smaller diameter, flow rate would be higher [See Figure 1].

In regard to claim 2, the Green reference shows a conical regenerator in Figure 1. The horizontal cross section in this case would be circular.

In regard to claim 4, the Green reference teaches the temperature in the first section (and therefore the temperature of the catalyst in the first section) is between 70°F to 700°F [See Column 9, lines 65-68]. This is a process limitation and is not given patentable weight.

In regard to claim 5, Green teaches the catalyst flows between reaction zones as a fluidized bed. See Figure 1.

In regard to claim 6, the Green reference teaches withdrawing the regenerated catalyst from the first section via line 20 in Figure 1.

In regard to claim 7, Green teaches additional oxygen is added in the second section [See 5 in Figure 1].

In regard to claim 9, Green teaches at the top of the second zone the temperature is in the range of 900°F to 1100°F [See Column 10, lines 3-4]. This is a process limitation and is not given patentable weight.

In regard to claim 10, Green teaches spent catalyst is admitted to the regenerator via line 3 in Figure 1.

Claims 13, 16-17, and 19 are rejected under 35 U.S.C. 102(b) as being anticipated by Green et al. (US Patent No. 4,991,521). These claims are drawn to a method.

In regard to claim 13, Green et al. teaches a combustion process for removing coke from a catalyst. The regenerator (Figure 1) used for this process has a first section (12) in which spent catalyst enters and a second section (13) connected by an interface (13). Carbon monoxide (a combustion product from the first section) is completely afterburned to CO_2 [See Column 5, lines 19-22]. Gas velocity in the first

section is 10-50 ft/s and gas velocity in the second section is 0.05 to 4 ft/s [See Column 10, lines 28-45]. The temperature in the first section (and therefore the temperature of the catalyst in the first section) is between 70°F to 700°F [See Column 9, lines 65-68]. At the top of the second zone the temperature is in the range of 900°F to 1100°F [See Column 10, lines 3-4].

In regard to the amended features of claim 13, Green et al. teaches additional air or oxygen containing gas can be added from line 22 into the lift riser 23, preferably somewhat above the point of addition of spent catalyst to the FCC regenerator. This added gas would exhibit co-current flow with the downward flowing catalyst. The regenerator has a first section (12) and a second section (14).

In regard to claim 16, the Green reference teaches the residence times in the regenerator may range from 1 to 20 min, depending on the particular regenerator design and operating conditions [See Column 10, lines 56-59]. The regenerated catalyst is withdrawn from the first section via line 20 in Figure 1. By teaching the residence time of the catalyst and method of removing, the Green reference inherently teaches transfer of all of the catalyst through the system.

In regard to claim 17, Green teaches additional oxygen is added in the second section [See 5 in Figure 1].

In regard to claim 19, Green teaches an inventory of fine catalyst is continuously cycled between a cracking reactor and a catalyst regenerator. The spent catalyst is admitted to the regenerator via line 3 in Figure 1.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 3, 8, 11-12, 14, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Green et al. (US Patent No. 4,991,521) in view of Scott (US Patent No. 4,313,848)

In regard to claim 3, the Green reference teaches the cross-sectional area of the second section is 15 to 90% of the average cross-sectional area of the first section [See Column 4, lines 19-22]. This satisfies the relationship between the diameters of the two reaction zones. The Green reference does not disclose the relationship between the heights of the two sections.

Scott et al. teaches the height of the upper section of the regeneration zone containing the bed of regenerated catalyst must be sufficient to permit essentially complete combustion of carbon monoxide in the regeneration gas stream in contact with the coke free catalyst [See Column 6, lines 48-52]

One of ordinary skill in the art, at the time of Applicant's invention, would be motivated to optimize the height of the upper and lower sections of the regeneration zone like shown in the Scott reference in such as reactor as disclosed by Green to reach a level of complete regeneration of the catalyst by combustion of coke to carbon monoxide. This particular parameter (regenerator height) is recognized by the Scott reference as a result-effective variable, i.e., a variable which achieves a recognized result, and therefore the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). See MPEP 2144.05 II-B.

In regard to claim 8, the Green reference does not disclose the amount of oxygen-containing gas received in the first section but does disclose the effect of excess oxygen and temperature on calculated equilibrium NO_x emissions in Figure 3. However, this is a process limitation in an apparatus claim and is given little patentable weight.

Scott et al. teaches an amount of free oxygen is introduced sufficient to react stoichiometrically with all of the coke carbon in the catalyst to form carbon monoxide and restricted to an amount less than needed to react with coke to form carbon dioxide [See Column 6, lines 55-65]

One of skill in the art, at the time of Applicants invention, would be motivated to provide equal to or less than the amount of oxygen required to convert the carbon to carbon monoxide in order to avoid NO_x production from NO_x precursors in the catalyst. [See Green, Abstract or Prior Art] and it is desirable to burn carbon monoxide as completely as possible within the catalyst regeneration system to conserve heat [See Scott, Column 1, lines 45-47].

In regard to claim 11, the Green reference fails to teach a catalyst to convert carbon monoxide to carbon dioxide in the second regenerator section.

Scott teaches the use of a carbon monoxide combustion-promoting metal [See Column 5, lines 31-33].

One of ordinary skill in the art, at the time of Applicant's invention, would be motivated to include a catalyst like that taught in Scott in the apparatus disclosed in the Green reference to enhance the rate of carbon monoxide burning [See Scott, Column 5, lines 41-43]

In regard to claim 12, Green et al. teaches a catalyst regenerator in Figure 1. The regenerator has a first section (12) in which spent catalyst enters and a second section (13) connected by an interface (13). The cross-sectional area of the second section is 15 to 90% of the average cross-sectional area of the first section [See Column 4, lines 19-22].

The Green reference does not disclose the relationship between the heights of the two sections.

Scott et al. teaches the height of the upper section of the regeneration zone containing the bed of regenerated catalyst must be sufficient to permit essentially complete combustion of carbon monoxide in the regeneration gas stream in contact with the coke free catalyst [See Column 6, lines 48-52]

One of ordinary skill in the art, at the time of Applicant's invention, would be motivated to optimize the height of the upper and lower sections of the regeneration zone like shown in the Scott reference in such as reactor as disclosed by Green to reach a level of complete regeneration of the catalyst by combustion of coke to carbon monoxide. See MPEP 2144.05 II-B.

In regard to the amended features of claim 12, Green et al. teaches additional air or oxygen containing gas can be added from line 22 into the lift riser 23, preferably somewhat above the point of addition of spent catalyst to the FCC regenerator. This added gas would exhibit co-current flow with the downward flowing catalyst. The regenerator has a first section (12) and a second section (14). Because the first section has a smaller diameter, flow rate would be higher [See Figure 1]. Carbon monoxide formed in the dense bed will be completely afterburned to CO_2 [See Column 5, lines 19-20]

In regard to claim 14, the Green reference teaches the cross-sectional area of the second section is 15 to 90% of the average cross-sectional area of the first section [See Column 4, lines 19-22]. This satisfies the relationship between the diameters of the two reaction zones. The Green reference does not disclose the relationship between the heights of the two sections.

Scott et al. teaches the height of the upper section of the regeneration zone containing the bed of regenerated catalyst must be sufficient to permit essentially complete combustion of carbon monoxide in the regeneration gas stream in contact with the coke free catalyst [See Column 6, lines 48-52]

One of ordinary skill in the art, at the time of Applicant's invention, would be motivated to optimize the height of the upper and lower sections of the regeneration zone like shown in the Scott reference in such as reactor as disclosed by Green to reach a level of complete regeneration of the catalyst by combustion of coke to carbon monoxide. See MPEP 2144.05 II-B.

In regard to claim 18, the Green reference does not disclose the amount of oxygen-containing gas received in the first section but does disclose the effect of excess oxygen and temperature on calculated equilibrium NO_x emissions in Figure 3.

Scott et al. teaches an amount of free oxygen is introduced sufficient to react stoichiometrically with all of the coke carbon in the catalyst to form carbon monoxide and restricted to an amount less than needed to react with coke to form carbon dioxide [See Column 6, lines 55-65]

One of skill in the art, at the time of Applicants invention, would be motivated to provide equal to or less than the amount of oxygen required to convert the carbon to

carbon monoxide in order to avoid NO_x production from NO_x precursors in the catalyst. [See Green, Abstract or Prior Art] and it is desirable to burn carbon monoxide as completely as possible within the catalyst regeneration system to conserve heat [See Scott, Column 1, lines 45-47].

In regard to claim 20, the Green reference fails to teach a catalyst to convert carbon monoxide to carbon dioxide in the second regenerator section.

Scott teaches the use of a carbon monoxide combustion-promoting metal [See Column 5, lines 31-33].

One of ordinary skill in the art, at the time of Applicant's invention, would be motivated to include a catalyst like that taught in Scott in the apparatus disclosed in the Green reference to enhance the rate of carbon monoxide burning [See Scott, Column 5, lines 41-43]

Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Green et al. (US Patent No. 4,991,521).

In regard to claim 15, Green teaches the temperature in the first section is between 70°F to 700°F [See Column 9, lines 65-68]. At the top of the second zone the temperature is in the range of 900°F to 1100°F [See Column 10, lines 3-4].

It would have been obvious to one of skill in the art, at the time of Applicant's invention, to operate the process taught by the Green reference in the claimed temperature ranges because in the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). See MPEP 2144.05 – I.

Response to Arguments

Applicant's arguments filed on 11/04/2008 have been fully considered but they are not persuasive. Applicant's arguments with respect to the amended claims have been considered but are moot in view of the new ground(s) of rejection. In regard to the amended features of the claims, Green et al. teaches additional air or oxygen containing gas can be added from line 22 into the lift riser 23, preferably somewhat above the point of addition of spent catalyst to the FCC regenerator. This added gas would exhibit co-current flow with the downward flowing catalyst. The regenerator has a first section (12) and a second section (14). Because the first section has a smaller diameter, flow rate would be higher [See Figure 1]. Carbon monoxide formed in the dense bed will be completely afterburned to CO_2 [See Column 5, lines 19-20]

Conclusion

Claims 1-20 are rejected.

No claims are allowed.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JENNIFER A. SMITH whose telephone number is (571)270-3599. The examiner can normally be reached on Monday - Friday, 8:30am to 5:00pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jerry Lorengo can be reached on (571)272-1233. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J.A. LORENGO/
Supervisory Patent Examiner, Art Unit 1793

Jennifer A. Smith
January 19, 2008
Art Unit 1793

JS